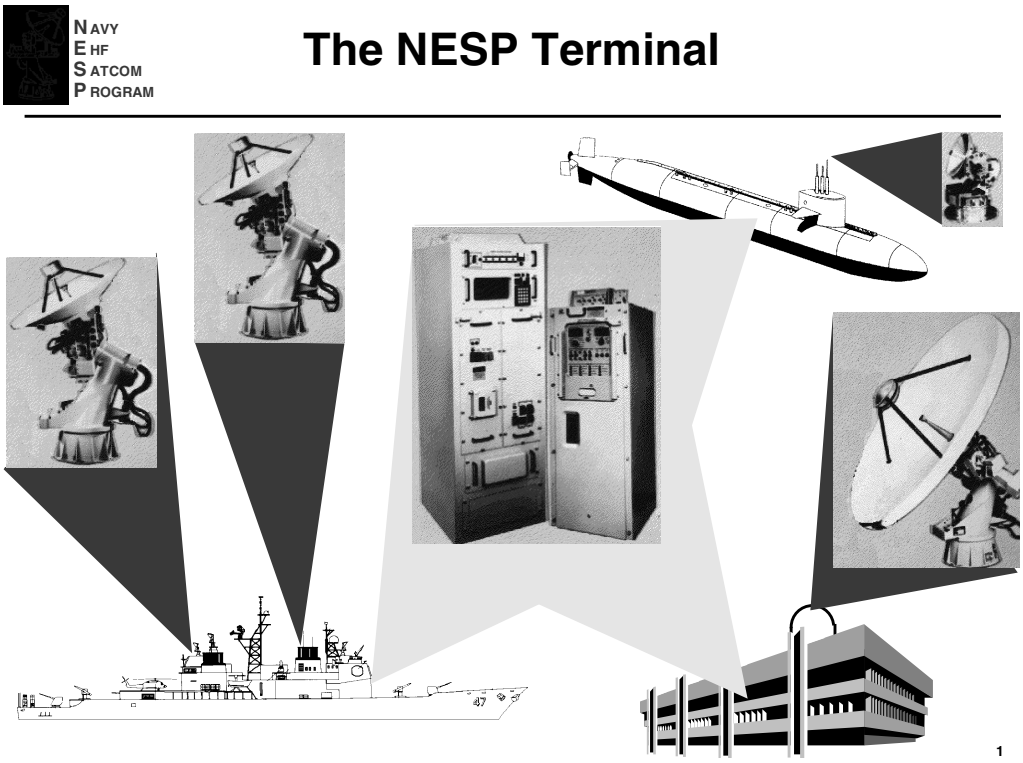
NAVY EXTREMELY HIGH FREQUENCY SATELLITE COMMUNICATIONS PROGRAM (NESP)



Navy ACAT IC Program

Total Number of Systems:	359
Total Program Cost (TY$):	$2.1B
Average Unit Cost (TY$):	$5.8M
Full-rate production:	3QFY93
Production Decision for Follow-On Terminal:	1QFY06

Prime Contractor

Raytheon

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Navy Extremely High Frequency (EHF) Satellite Communications Program (NESP) terminal connects ship, shore, and submarine platforms to the Military Strategic and Tactical Relay (MILSTAR) satellite constellation. The NESP terminal supports survivable, endurable, and flexible worldwide command and control communications to strategic and tactical Naval forces through all levels of conflict. The NESP terminal provides minimum essential secure communications in stressed environments that require anti-jam and low probability-of-intercept capabilities. NESP will enable our forces to maintain ***information superiority*** through all levels of conflict, enhancing ***full-dimensional protection*** to our warfighters by capitalizing on the unique capabilities of the MILSTAR satellite system.

There are three different configurations of the NESP terminal corresponding to ship, shore, and submarine platforms. Although each terminal has the same basic capabilities, their antennas and other peripheral equipment vary by platform. In addition to communicating with the MILSTAR satellites, the NESP terminals can operate with the EHF Package on Fleet Satellites 7 and 8 and with EHF packages on UHF Follow-On satellites 4 through 10.

In keeping with the 1992 restructuring of the MILSTAR program, the NESP terminal is being upgraded to add a tactical medium data rate (MDR) capability to the existing strategic low data rate (LDR) capability. The maximum low data rate is 2.4 kbps, while the maximum medium data rate is substantially higher at 1.544 mbps. A limited number (71) of the existing NESP ship and shore terminals are being upgraded with a medium data rate appliqué to achieve the combined low/medium data rate MILSTAR capability. However, to satisfy terminal requirements beyond upgrading the existing NESP ship and shore terminals, the Navy has initiated a new Follow-On Terminal program. In addition to providing low/medium data rate communications at extremely high frequencies, the Follow-On Terminal will also support super high frequency satellite communications and Global Broadcast Service satellites. The submarine low data rate terminals are undergoing medium data rate upgrades, including modification for a new mast and 16" antenna, as well as addition of the super high frequency and Global Broadcast Service capabilities.

The Navy is developing two new communications controllers, the Navy EHF Communications Controller (NECC) and the Time Division Multiple Access Interface Processor (TIP). The NECC and TIP are baseband interface units that allow more efficient use of MILSTAR satellite resources. The NECC supports LDR networks, while the TIP supports MDR networks.

BACKGROUND INFORMATION

The NESP low data rate terminal reached full production status in 1993. IOT&E for the low data rate terminal included three operational tests:

- The first operational test, OT-IIA in June 1988, supported the Milestone IIIA decision in September 1988.

- The second and third operational tests, OT-IIB and OT-IIC (conducted in September 1990 and August 1992, respectively), supported the Milestone IIIB decision in April 1993.

  Since the NESP IOT&E occurred before the first MILSTAR satellite was on orbit, Navy Fleet Satellites with EHF payloads supported the three IOT&E events. Two follow-on operational tests were conducted after the first MILSTAR satellite was in orbit.

- OT-IIIA (August and September 1994) and OT-IIIB (June, July, and September 1996) verified the NESP terminal with an in-orbit MILSTAR satellite. OT-IIIA addressed unresolved issues and deficiencies observed in prior tests, while OT-IIIB addressed low data rate anti-jam and low probability of intercept performance.

TEST & EVALUATION ACTIVITY

Army, Navy, and Air Force terminals participated in the developmental MILSTAR System Tests in July 1997, August 1998, and August 1999. In these medium data rate-focused developmental tests, Service terminals were connected to the MILSTAR satellite payloads at the contractor's facility in Sunnyvale, CA. The Army's low/medium data rate capable Secure, Mobile, Anti-jam, Reliable, Tactical Terminal (SMART-T) and the NESP terminal, equipped with a medium data rate appliqué, participated in both low and medium data rate tests. The Air Force Command Post Terminal and the Army Single Channel, Anti-Jam, Man-Portable (SCAMP) terminal participated in the low data rate tests. These tests examined the compatibility and interoperability of the NESP terminal with both MILSTAR payloads. The tests included low and medium data rate signal acquisitions, simultaneous network operations, interoperable network and point-to-point calls, antenna and network control functions, and Year 2000 rollovers.

The April 30, 1999, MILSTAR Flight 3 launch failure has delayed the planned in-orbit testing of the NESP MDR appliqué by approximately one year. Operational testing will now occur following the launch of MILSTAR Flight 4, expected in 2QFY01. After Flight 4 in-orbit payload checkout is complete, NESP MDR terminals will participate in MILSTAR System Test 8000, a technical test to demonstrate compatibility and interoperability with the low and medium data rate payloads in orbit. Tests will include satellite acquisition, simultaneous network operations, interoperable network and point-to-point calls with Army, Navy, and Air Force terminals, and antenna and network control functions.

The medium data rate OT&E for the NESP terminal, which will evaluate the operational performance of the MDR appliqué terminals and the NECC, is being planned for 2QFY01. The test will be conducted using on shore and at sea terminals, and will include Army terminals to demonstrate Service terminal interoperability. Follow-on tests will be conducted to address the TIP, which is still under development, and any other issues that are not fully resolved during this test.

The submarine MDR terminal operational test schedule will be integrated into the overall MILSTAR and NESP terminal test schedules to the greatest extent possible, consistent with submarine terminal progress. Current plans are to conduct submarine terminal testing jointly during operational testing of the NESP ship and shore terminals in 2QFY01. Operational test of the NESP Follow-On Terminals is scheduled to begin 2QFY02.

TEST & EVALUATION ASSESSMENT

At the completion of the low data rate Initial Operational Test and &Evaluation, DOT&E concluded that the ship and shore NESP terminals were operationally effective and suitable. These findings supported full fleet introduction. COMOPTEVFOR and DOT&E recommended follow-on operational test to evaluate the suitability of the submarine terminal and the survivability of the ship and submarine terminals.

OT III-A verified the interoperability of the NESP terminal with a MILSTAR satellite, and completed resolution of all critical operational issues, except survivability, as satisfactory. The survivability issue was resolved as satisfactory in OT III-B, which addressed the anti-jam and low probability of intercept performance of the ship and submarine terminals.

Although the MILSTAR submarine terminal does meet the technical and operational requirements for low probability of intercept, operational tests showed that the submarine had a substantially higher probability of signal intercept than developmental tests had indicated. These low probability of intercept results re-inforce the role of operational testing in providing the warfighter with the most accurate operational performance information possible.

The MILSTAR satellite system provides earth coverage (low data rate) via a system of 37 separate but adjoining downlink communications beams called "agile" beams. Previously, the Navy terminals did not perform beam management techniques required to handle terminals as they transited from one beam coverage area to another. Operational testing confirmed that when the terminal that set up the communications network transitioned to an adjacent antenna beam, the satellite would turn off the "exited" beam and terminate communications service to all terminals remaining in that beam. Beam management techniques have since been incorporated into the terminals and will be operationally tested as part of Flight 4 operational tests.

The failure of MILSTAR Flight 3 has complicated NESP operational test planning and execution. The NESP TEMP and associated test plans are being updated for DOT&E approval in anticipation of testing with the in-orbit MILSTAR satellite in 2QFY01. Although the overall test approach is sound, the Navy will need to take a very aggressive approach to complete test planning, resourcing, and coordination in time to take full advantage of all opportunities for joint-Service terminal testing with an in-orbit satellite.

CONCLUSIONS

NESP LDR terminals are operationally effective and suitable. Although there are no known serious operational deficiencies, determination of NESP MDR operational effectiveness and suitability cannot be made until after completion of MDR OT&E with an in-orbit satellite.

RECOMMENDATIONS

In-orbit testing of the MDR capable NESP terminals has been delayed to 2QFY01 by the launch failure of MILSTAR Flight 3. The Navy will need to continue its aggressive approach in planning, resourcing, and coordinating upcoming tests in order to take full advantage of opportunities to conduct combined DT/OT, Joint Service terminal, and in-orbit satellite tests. Additionally, coordination and approval of an updated TEMP and associated operational test plans must be expedited to avoid test delays.